

# INDOT 2030 Long Range Transportation Plan

## Air Quality Issues

### Background

#### OZONE

##### What is ozone, and why is it bad for us?

Ozone is a colorless gas that can be found in the air we breathe. Each molecule of ozone is composed of three atoms of oxygen, one more than the oxygen molecule we need to breathe to sustain life. The additional oxygen atom makes ozone extremely reactive. Ozone exists naturally in the Earth's upper atmosphere, known as the stratosphere, where it shields the Earth from the sun's ultraviolet rays. However, ozone is also found close to the Earth's surface. This ground-level ozone is a harmful air pollutant.

##### Where does ground-level ozone come from?

Ground-level ozone is formed by a chemical reaction between volatile organic compounds (VOCs) and oxides of nitrogen in the presence of sunlight. Sources of VOCs and oxides of nitrogen include:

- Automobiles, trucks, and buses;
- Large industry and combustion sources such as utilities;
- Small industry such as gasoline dispensing facilities and print shops;
- Consumer products such as paints and cleaners;
- Off-road engines such as aircraft, locomotives, construction equipment, and lawn and garden equipment.

Ozone concentrations can reach unhealthy levels when the weather is hot and sunny with relatively light winds.

##### How does ozone affect human health?

Even at relatively low levels, ozone may cause inflammation and irritation of the respiratory tract, particularly during physical activity. The resulting symptoms can include breathing difficulty, coughing, and throat irritation. Breathing ozone can affect lung function and worsen asthma attacks. Ozone can increase the susceptibility of the lungs to infections, allergens, and other air pollutants. Medical studies have shown that ozone damages lung tissue and complete recovery may take several days after exposure has ended.

##### Who is sensitive to ozone?

Groups that are sensitive to ozone include children and adults who are active outdoors, and people with respiratory disease, such as asthma. Sensitive people who experience effects at lower ozone concentrations are likely to experience more serious effects at higher concentrations.

##### What is an Ozone Action Day?

An Ozone Action Day may be called by your state or local air quality agency when ozone levels are forecast to reach unhealthy levels. These programs, often in partnership with local businesses, encourage voluntary actions to reduce emissions of pollutants that contribute to ground-level ozone formation.

## **CLEAN AIR AND HIGHWAY LEGISLATION**

The Clean Air Act Amendments of 1990 (CAAA), Intermodal Surface Transportation Efficiency Act of 1991 (ISTEA), Transportation Equity Act for the 21st Century (TEA21), and SAFETEA-LU have combined to alter the environment in which transportation and air quality decisions are made throughout the nation and Indiana. Federal, state, and local decision makers must now respond to a wide range of new regulations, requirements, and processes for transportation system planning and development to provide better management and control of the major pollutants caused by transportation sources.

Transportation services and projects must play a major role in the effort to reduce emissions under the CAAA. In air quality "non-attainment" areas, transportation decisions may be shaped largely by the CAAA requirements, including specific measures to reduce emissions of several pollutants associated with mobile sources. Several pollutants associated with mobile sources include volatile organic compounds (VOC) and nitrogen oxides (NOx) which combine to make Ozone (O<sup>3</sup>); carbon monoxide (CO), and particulate matter (PM 2.5).

Given the magnitude of change brought about by these laws, it is important that transportation officials understand several key elements of the new transportation/air quality setting. The new conformity regulations place stronger constraints on transportation plans, programs, and projects, making it imperative that transportation planners work closely with air quality planners. These regulations include the following:

- The State Implementation Plan (SIP) process has a great impact on transportation, both through the establishment of emissions budgets and through the development of control strategies to reduce emissions. SIPs are plans at both the urbanized area and State level that are designed to achieve improved air quality and federally mandated controls and regulations.
- The CAAA has linked transportation to air quality actions--even actions directed at issues not related to mobile sources--since failure to meet the requirements of the act can lead to a cutoff of highway funds.
- Specific requirements in the CAAA are aimed at transportation directly, including measures to reduce emissions through technological improvements. Improvements may include (1) enhanced vehicle inspection and maintenance, (2) reformulated fuels, (3) alternative fuel vehicles, and (4) transportation control measures (TCMs) such as the employee commute option program in certain urbanized areas.
- SAFETEA-LU funding is available to for transportation projects that benefit air quality through the Congestion Mitigation and Air Quality Improvement (CMAQ) Program.
- TEA-21 recognized the relationship between transportation and air quality and emphasized the role of transportation conformity in the planning provisions of the statute. The USEPA and USDOT will continue to implement the conformity rule in accordance with the CAA and encourage State and local transportation and air quality agencies to coordinate their planning activities to achieve both transportation and air quality goals.

The ISTEA, CAAA, TEA 21, and SAFETEA-LU have combined to produce an unprecedented period of change in the transportation community. The acts and associated regulations emphasize the links between transportation policy and air quality concerns through (1) incentives to make investments that promote air quality and, (2) regulatory restrictions on transportation decisions in areas that fail to meet national ambient air quality standards.

### **Transportation Air Quality Conformity**

Transportation conformity is a process to ensure that Federal funding and approval are given to those transportation activities that are consistent with air quality goals. The conformity regulation requires that all transportation plans and programs in non-attainment or maintenance areas conform to the State's SIP (State Implementation Plan).

It ensures that transportation activities do not worsen air quality or interfere with the purpose of the SIP, which is to attain the NAAQS. Meeting the NAAQS often requires emission reductions from mobile sources. Several types of highway emissions reduction strategies are available (and, in some regions, required) to help regions attain the standards.

In addition, the conformity regulations affect transportation planning in several critical ways. Specifically:

- States and Metropolitan Planning Organizations (MPOs) must show that Transportation Plans and Transportation Improvements Programs result in emissions levels that fall within the "emissions budget" for mobile sources specified in each non-attainment/maintenance SIP.
- Transportation Control Measures (TCMs) contained in the SIP must be included in Transportation Plans and Transportation Improvement Programs.
- Over the 25 Year period of the Transportation Plans, many areas must show reductions in emissions of key pollutants, notably NO<sub>x</sub> and VOC.

#### **Failure to Meet Transportation Conformity**

Failure to meet the conformity requirements can result in the expiration of the Transportation Plan and the Transportation Improvement Program (TIP) and thus halting federal funding for many transportation projects. In addition, transportation may be affected by a state's or urban area's inability to meet any of the CAAA requirements--whether or not the lack of compliance is related to transportation measures. Failure to obtain a required SIP revision approval (even if that SIP revision relates to a non-transportation issue) can result in the loss of federal transportation funds.

In order to address the clean air challenges successfully, it is crucial that transportation officials become involved in air quality early in the planning process. Transportation officials need to be actively involved in the various SIP processes, particularly in the establishment of emissions budgets, which become key constraints on future transportation plans and programs.

In addition, transportation planners need to incorporate a range of current and new players into the decision-making process, including the U. S. Environmental Protection Agency (EPA), the Indiana Department of Environmental Management (IDEM), special interest groups, and the general public. Cooperation between all these groups is essential if Indiana is to comply with ISTEA and CAAA air quality requirements.

### **Ozone Non-Attainment and Maintenance Areas Classifications**

For the pollutant Ozone, Indiana currently has six attainment/maintenance air quality areas, three (3) basic air quality non-attainment areas, one marginal non-attainment area, and one (1) moderate non-attainment area for Ozone. The six (6) Indiana areas originally classified as marginal non-attainment were reclassified to attainment/maintenance in 2005 and 2006. Although these areas are now attainment for ozone, the maintenance designation means they are required to perform the same air quality conformity activities they did as marginal non-attainment areas for the next twenty years

Areas in Indiana fall within one of three (3) classifications; maintenance attainment, Basic non-attainment, marginal non-attainment, or moderate non-attainment. Each non-attainment or maintenance area classification has an associated definition and mandatory transportation provisions. The transportation provisions of the Clean Air Act as amended in 1990 for maintenance and non-attainment area classifications are specified in the various CAAA and subsequent legislation.

#### **8-Hour Ozone Non-Attainment Areas**

In July 1997, EPA revised the National Ambient Air Quality Standards (NAAQS) for ozone. EPA is currently phasing out and replacing the existing 1-hour ozone standard with the "new" 8-hour standard to protect against longer exposure periods.

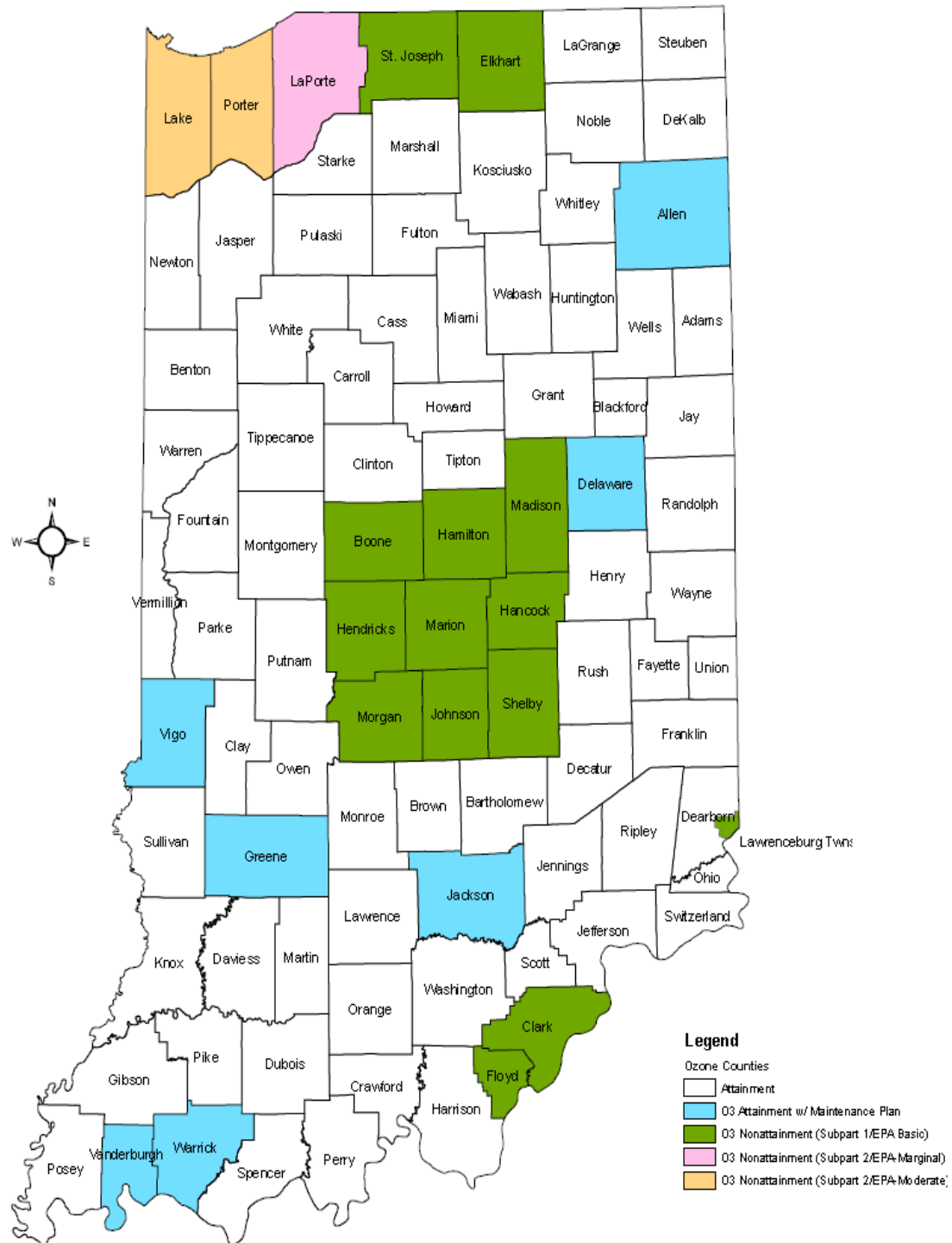
The Threshold value for both the primary and secondary 8-hour standard is 0.08 parts per million (ppm), as measured as maximum daily 8-hour average concentrations. To attain the new ozone NAAQS, the 3-year average of the annual 4th-highest daily maximum 8-hour ozone concentration must be less than or equal to 0.08 ppm.

In the year 2000, EPA formally determined which areas of the country do not meet its new 8-hour ozone standard and designated them as "non-attainment." In doing so, EPA will use the 3 most recent years of data (e.g., 1997-1999). In the interim, all areas of the country must continue to implement the programs that

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led to their attaining the 1-hour standard. The map in **Figure 5-1** shows areas of Indiana that do not meet the 8-hour standard based on 1994 to 1996 monitored data.

**Indiana 8-Hour Ozone Nonattainment Areas as of February 12, 2007**



**Figure 5-1**

## **Fine Particulate Matter**

Also called particulate matter, fine particles are one of six criteria pollutants addressed by the Clean Air Act. These pollutants have been identified as being particularly harmful to humans and the environment.

### **Fine Particle Pollution – PM 10 and PM 2.5**

Particle pollution in the air includes a mixture of solids and liquid droplets. Some particles are emitted directly; others are formed in the atmosphere when other pollutants react. Particles come in a wide range of sizes. Those less than 10 micrometers in diameter (PM 10) are so small that they can get into the lungs, potentially causing serious health problems. Ten micrometers is smaller than the width of a single human hair.

- Fine particles (PM2.5). Particles less than 2.5 micrometers in diameter are called "fine" particles. These particles are so small they can be detected only with an electron microscope. Sources of fine particles include all types of combustion, including motor vehicles, power plants, residential wood burning, forest fires, agricultural burning, and some industrial processes.
- Coarse dust particles. Particles between 2.5 and 10 micrometers in diameter are referred to as "coarse." Sources of coarse particles include crushing or grinding operations, and dust stirred up by vehicles traveling on roads.

Figure 5-2 shows the non-attainment areas in Indiana for PM 2.5.

## **Re-Designation Petitions and Maintenance Plans**

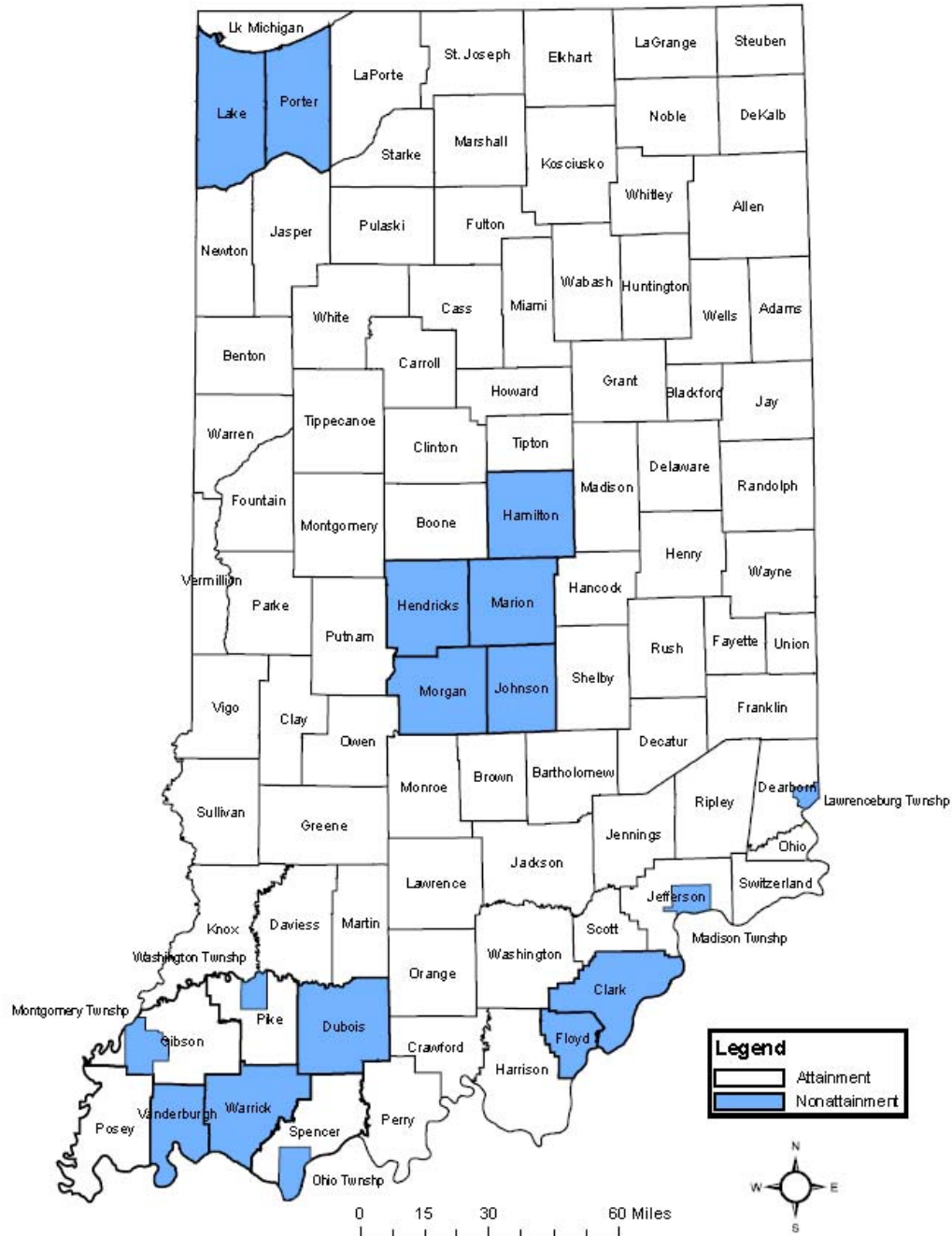
This section is dedicated to Indiana's Re-designation Petitions and Maintenance Plans for counties that now meet the National Ambient Air Quality Standards (NAAQS). The Indiana Department of Environmental Management (IDEM) has prepared these Re-designation Petitions and Maintenance Plans for U.S. Environmental Protection Agency (USEPA) review and consideration for these counties to be re-designated from non-attainment to attainment, and classified as maintenance under the standards. The list is broken down by non-attainment area and provides additional information to support continued compliance with the standard(s).

- Central Indiana Ozone Non-Attainment Area: Indianapolis, Anderson, and Columbus: Re-designation submitted March 26, 2007.
- Clark and Floyd Counties Ozone Non-Attainment Area: Re-designation submitted July, 2006.
- Evansville Ozone Non-Attainment Area (Vanderburgh and Warrick Counties): Re-designation approved and formally re-designated as an Attainment/Maintenance area by the USEPA effective January 30, 2006.
- Gary/Hammond Sulfur Dioxide (SO<sub>2</sub>) Non-Attainment Area (Lake County): Re-designation submitted August 12, 2005.
- Lake and Porter Counties Ozone Non-Attainment Area: Re-designation submitted September 12, 2006.
- LaPorte County Ozone Non-Attainment Area: Re-designation submitted May 30, 2006. Linton (Greene County) Ozone Non-Attainment Area: Re-designation approved and formally re-designated as an Attainment/Maintenance area by the USEPA effective December 29, 2005.
- Muncie (Delaware County) Ozone Non-Attainment Area: Re-designation approved and formally re-designated as an Attainment/Maintenance area by the USEPA effective January 3, 2006.
- Seymour (Jackson County) Ozone Non-Attainment Area: Re-designation approved and formally re-designated as an Attainment/Maintenance area by the USEPA effective December 29, 2005.
- St. Joseph/Elkhart County Ozone Non-Attainment Area: Re-designation submitted May 30, 2006.
- Terre Haute (Vigo County) Ozone Non-Attainment Area: Re-designation approved and formally re-designated as an Attainment/Maintenance area by the USEPA effective February 6, 2006.

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- Fort Wayne (Allen County) Ozone Non-Attainment Area: Re-designation approved and formally re-designated as an Attainment/Maintenance area by the USEPA effective February 12, 2007.

U.S. EPA Final Designations for Fine Particle "PM 2.5" Standard  
April 2005



### Figure 5-2

## **Congestion Mitigation and Air Quality Program**

One important element of meeting these new challenges is the Congestion Mitigation and Air Quality Program (CMAQ). Congress allocated money for the CMAQ program to be used to fund Transportation Control Measures (TCMs) or other programs designed to implement an urbanized area's transportation/air quality plan. The CMAQ program was established to assist in achieving attainment. INDOT and the MPOs have been using CMAQ funds to support a wide variety of projects such as the implementation of vehicle inspection/maintenance (I/M) programs, public education programs, transit and congestion reduction projects. Other possible uses include using these funds to support projects that improve intermodal freight distribution activities that are justified by air quality benefits.

CMAQ projects are usually classified in one of several categories noted below:

- Transit improvements;
- Shared ride services;
- Traffic flow improvements;
- Demand management strategies;
- Pedestrian and bicycle programs;
- Vehicle inspection/maintenance (I/M) programs;
- Conversion of public fleets to alternative fuels, and;
- Public education and outreach programs.

### **Indiana's Policy and Procedures for the CMAQ Improvement Program**

INDOT has developed policy and procedures that establishes how the CMAQ Program will be administered in the State of Indiana. It is applicable to projects proposed in non-attainment areas by either the Metropolitan Planning Organizations (MPOs) or the State of Indiana. The Indiana CMAQ policy incorporates many aspects of the joint Federal Highway Administration (FHWA) and Federal Transit Administration (FTA) guidance of October 16, 1992, and April 9, 1993, on the CMAQ program. The federal guidance is included in this policy as an ongoing source of reference. The policy also contains other elements that may be considered unique to Indiana.

Included in this policy are sections relating to: (1) the formula for suballocating funds to Indiana's non-attainment areas; (2) eligible projects; (3) project selection criteria, and; (4) the project development and submittal process. It is the intent of this policy that the parties governed by it, INDOT, the Indiana Department of Environmental Management (IDEM) and the MPOs, have equal status and that each will work in a cooperative spirit with the other toward meeting the objectives of this policy, SAFETEA-LU and the CAAA.

## **Summary**

The Indiana Department of Transportation faces many challenges in successfully meeting the transportation needs of the State of Indiana while simultaneously achieving air quality goals. A multimodal transportation planning process focused on adherence to the air quality provisions of CAAA and SAFETEA-LU will help INDOT meet our responsibility to provide improved mobility, quality of life, and economic vitality for all Indiana citizens.

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